Multiple Choice Answers

Test ID A

1. D
2. D
3. C
4. A
5. D
6. E
7. B
8. A
9. B
10. E
11. B
12. D
13. B
14. D
15. C
16. E
17. B
18. D
19. B
20. A
21. A

Test ID B

1. C
2. C
3. E
4. A
5. E
6. B
7. C
8. D
9. E
10. E
11. E
12. B
13. D
14. B
15. A
16. C
17. B
18. E
19. D
20. D
21. B

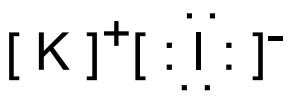
22. SHORT ANSWER QUESTIONS:

Test ID A: Question 1	**Test ID B: Question 8**

Ionic Compounds	**Covalent Compounds**
Dissolve very easily in water	Generally have low solubility in water
Conduct electricity well in aqueous solutions	Do not conduct electricity well.
Hard, crystalline substances at SATP	Various states (gases, liquids, solids) at SATP
Eg. NaCl	**Eg. CO_2**

Test ID A: Question 2	**Test ID B: Question 2**

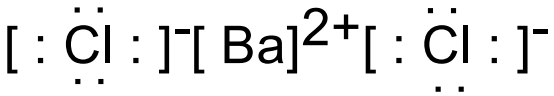
KI (Ionic Compound)



Br_2 (Covalent Compound)

O_2 (Covalent Compound)

$BaCl_2$ (Ionic Compound)



Test ID A: Question 3	**Test ID B: Question 7**

Ionic Bonding:

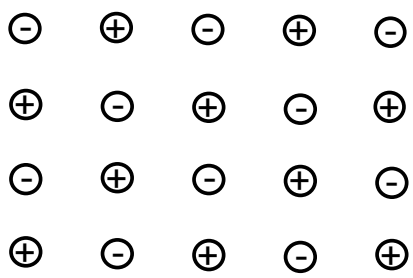
1. Ionic bond is the **attraction** between **oppositely charged ions** (electrostatic force of attraction).

2. Charged ions are created when valence electrons are removed (**cation** / **positively charged ions**) or electrons are added to the valence shell (**anion** / **negatively charged ions**) of atoms.

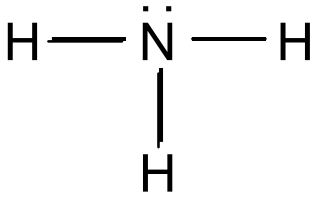
3. Usually **metals lose electrons** (low Ionization energy) and **non-metals gain electrons** (high Electron affinity) creating oppositely charged ions for ionic bonding.

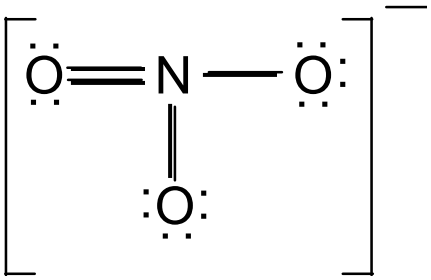
4. Ionic bonds are formed between atoms with **electronegative** differences greater than 1.7 – this causes the element with the higher electronegative atom to pull the electron towards itself making the bond partners oppositely charged ions.

5. Ionic compounds form **crystal lattices** in solid state. In these lattices, each cation is surrounded by anions and each anion is surrounded by cations thus allowing for maximum attractive interaction. This lattice structure (see figure) in three dimensions makes the ionic solid very hard.



Test ID A: Question 4	**Test ID B: Question 6**
Ammonia NH_3	Nitrate NO_3^-
W – 8+2+2+2 = 14	W – 8+8+8+8 =32
A – 5+1+1+1 = 8	A – 5+6+6+6+1 = 24
N – 14-8 = 6	N – 32-24= 8
D – 6 / 2 = 3 bonds	D – 8 / 2 = 4 bonds





The reason why nitrogen can form two different molecules is because nitrogen can have **multiple oxidation numbers** (+3 in ammonia and +5 in nitrate ion).

Test ID A: Question 5	**Test ID B: Question 1**

	Name # 1	**Name # 2**
$CuCO_2$	Copper (II) carbonite	Cupric carbonite
PH_3	Phosphorus (III) hydride	Phosphorus trihydride
PbO_2	Lead (IV) oxide	Plumbic oxide
CH_4	Carbon (IV) hydride	Methane
Na_2HPO_4	Sodium hydrogen phosphate	Sodium biphosphate

Test ID A: Question 6	**Test ID B: Question 3**

A. (single displacement)

$Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$

or

$Cu + AgNO_3 \rightarrow CuNO_3 + Ag$

B. (double displacement)

$3CaCl_2 + 2Na_3PO_4 \rightarrow Ca_3(PO_4)_2 + 6NaCl$

C. (single displacement)

$2K + 2H_2O \rightarrow 2KOH + H_2$

D. (combination / synthesis) (<u>not combustion</u>)

$2Fe + O_2 \rightarrow 2FeO$

or

$4Fe + 3O_2 \rightarrow 2Fe_2O_3$

Test ID A: Question 7	**Test ID B: Question 4**

1. **Ionization Energy** (IE) is the energy required to remove a valence electron from an atom. **Electron Affinity** (EA) is the energy released when an atom accepts an electron in its valence shell.

2. Both ionization energy and electron affinity have similar trends in the periodic table because they depend on **atomic radius**. As atomic radius **decreases** both IE and EA **increase**.

3. Atomic radius increases as we go from **top to bottom** of the periodic table because new shells are being added. This means that the **valence electrons are farther from the nucleus** and easy to remove (**lower IE**) because the inner shell electrons **shield** the valence electrons. This also means that the energy released when an atom accepts an electron is also lower (**lower EA**).

4. Atomic radius decreases as we move from **left to right** in the same period/ row. This is because the nuclear charge increases and the **electrons are entering the same shell** and so the increased attraction between nucleus and electrons decreases the radius. This increased attraction makes it harder to remove electrons (**higher IE**) and this also means that the atom releases greater energy for an accepted electron (**higher EA**).

Test ID A: Question 8	**Test ID B: Question 5**

THOMSON:

Thomson proposed the **raisin bun / plum pudding model** of the atom. He suggested that the atom was not indivisible and that it contained positive and negative particles. In his opinion, these positive and negative particles were distributed evenly in the atom.

Thomson developed his model from his experiments with the **cathode ray tube**. He noticed that, rays moved from the negative electrode (anode) to the positive electode (cathode). He was able to deduce that these rays consisted of negatively charged particles called **electrons** and since an atom is neutral, he thought that there must be positively charged particles within the atom to balance these negatively charged electrons.

RUTHERFORD:

Rutherford modified the Thomson plum pudding model of an atom. He proposed that an atom had a **dense positively charged centre**. He called this centre a **nucleus**. Surrounding the nucleus was mostly empty space where the **electrons** were to be found.

Rutherford developed this model by experimenting with **alpha particles**. Alpha particles are **positively charged** and Rutherford shot alpha particles at very **thin gold foil**. Most of the alpha particles went through undeflected, but some of the particles were **deflected** by very large angles. Rutherford concluded that there must be a dense concentration of positive charge within the atoms such that it **repelled** the positively charged alpha particles. He therefore deduced the presence of the nucleus.

Rutherford **did not** make any conclusions about neutrons.